

# PATENT COOPERATION TREATY

From the INTERNATIONAL BUREAU

**PCT**

## NOTIFICATION OF ELECTION

(PCT Rule 61.2)

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ÉTATS-UNIS D'AMÉRIQUE

in its capacity as elected Office

Date of mailing (day/month/year) 08 April 1999 (08.04.99)	
International application No. PCT/GB98/01734	Applicant's or agent's file reference IPD/P2567/WOD
International filing date (day/month/year) 15 June 1998 (15.06.98)	Priority date (day/month/year) 16 June 1997 (16.06.97)
Applicant MARSHALL, Gillian, Fiona et al	

1. The designated Office is hereby notified of its election made:

☒ in the demand filed with the International Preliminary Examining Authority on:

11 January 1999 (11.01.99)

☐ in a notice effecting later election filed with the International Bureau on:

2. The election ☒ was

☐ was not

made before the expiration of 19 months from the priority date or, where Rule 32 applies, within the time limit under Rule 32.2(b).

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Facsimile No.: (41-22) 740.14.35

Authorized officer

S. Mafla

Telephone No.: (41-22) 338.83.38

## PCT

## INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference <b>IPD/P2567/WOD</b>	<b>FOR FURTHER ACTION</b> see Notification of Transmittal of International Search Report (Form PCT/ISA/220) as well as, where applicable, item 5 below.	
International application No. <b>PCT/GB 98/ 01734</b>	International filing date (day/month/year) <b>15/06/1998</b>	(Earliest) Priority Date (day/month/year) <b>16/06/1997</b>
Applicant  <b>THE SECRETARY OF STATE FOR DEFENCE et al.</b>		

This International Search Report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This International Search Report consists of a total of 3 sheets.

☒ It is also accompanied by a copy of each prior art document cited in this report.

1. ☐ Certain claims were found unsearchable (see Box I).

2. ☐ Unity of invention is lacking (see Box II).

3. ☐ The international application contains disclosure of a **nucleotide and/or amino acid sequence listing** and the international search was carried out on the basis of the sequence listing

☐ filed with the international application.

☐ furnished by the applicant separately from the international application,

☐ but not accompanied by a statement to the effect that it did not include matter going beyond the disclosure in the international application as filed.

☐ Transcribed by this Authority

4. With regard to the title, ☒ the text is approved as submitted by the applicant

☐ the text has been established by this Authority to read as follows:

5. With regard to the abstract,

☒ the text is approved as submitted by the applicant

☐ the text has been established, according to Rule 38.2(b), by this Authority as it appears in Box III. The applicant may, within one month from the date of mailing of this International Search Report, submit comments to this Authority.

6. The figure of the **drawings** to be published with the abstract is:

Figure No. 2 ☒ as suggested by the applicant.

☐ None of the figures.

☐ because the applicant failed to suggest a figure.

☐ because this figure better characterizes the invention.

## INTERNATIONAL SEARCH REPORT

International Application No

PCT/GB 98/01734

## A. CLASSIFICATION OF SUBJECT MATTER

IPC 6 H01L27/146

According to International Patent Classification(IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 6 H01L

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US 5 155 353 A (PAHR PER O) 13 October 1992 see column 3, line 64 - column 6, line 13; figure 2 ---	1-17,21
Y	US 5 276 407 A (MEAD CARVER A ET AL) 4 January 1994 see column 1, line 24 - column 3, line 43; figure 1 ---	1-17,21
P,X	EP 0 828 297 A (HONDA MOTOR CO LTD) 11 March 1998 see column 1, line 31 - column 6, line 58; figures 1,5-9 --- -/--	1-5,7,21



Further documents are listed in the continuation of box C.



Patent family members are listed in annex.

## ° Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

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"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

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Date of the actual completion of the international search

28 September 1998

Date of mailing of the international search report

20/10/1998

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## INTERNATIONAL SEARCH REPORT

International Application No

PCT/GB 98/01734

## C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	WO 97 21304 A (COLLINS STEPHEN ; SECR DEFENCE (GB); WADE MICHAEL (GB); MARSHALL GI) 12 June 1997 see page 10, line 4 - page 11, line 17; figures 1-5 ---	1-21
A	US 4 078 243 A (DE BAR DAVID E ET AL) 7 March 1978 see column 4, line 29 - column 4, line 60; figure 3 ---	1-21
A	US 5 363 000 A (MIYATAKE SHIGEHIO ET AL) 8 November 1994 see abstract; figure 2 ---	1-21
A	US 5 289 023 A (MEAD CARVER A) 22 February 1994 see column 5, line 50 - column 5, line 55 -----	4

# INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/GB 98/01734

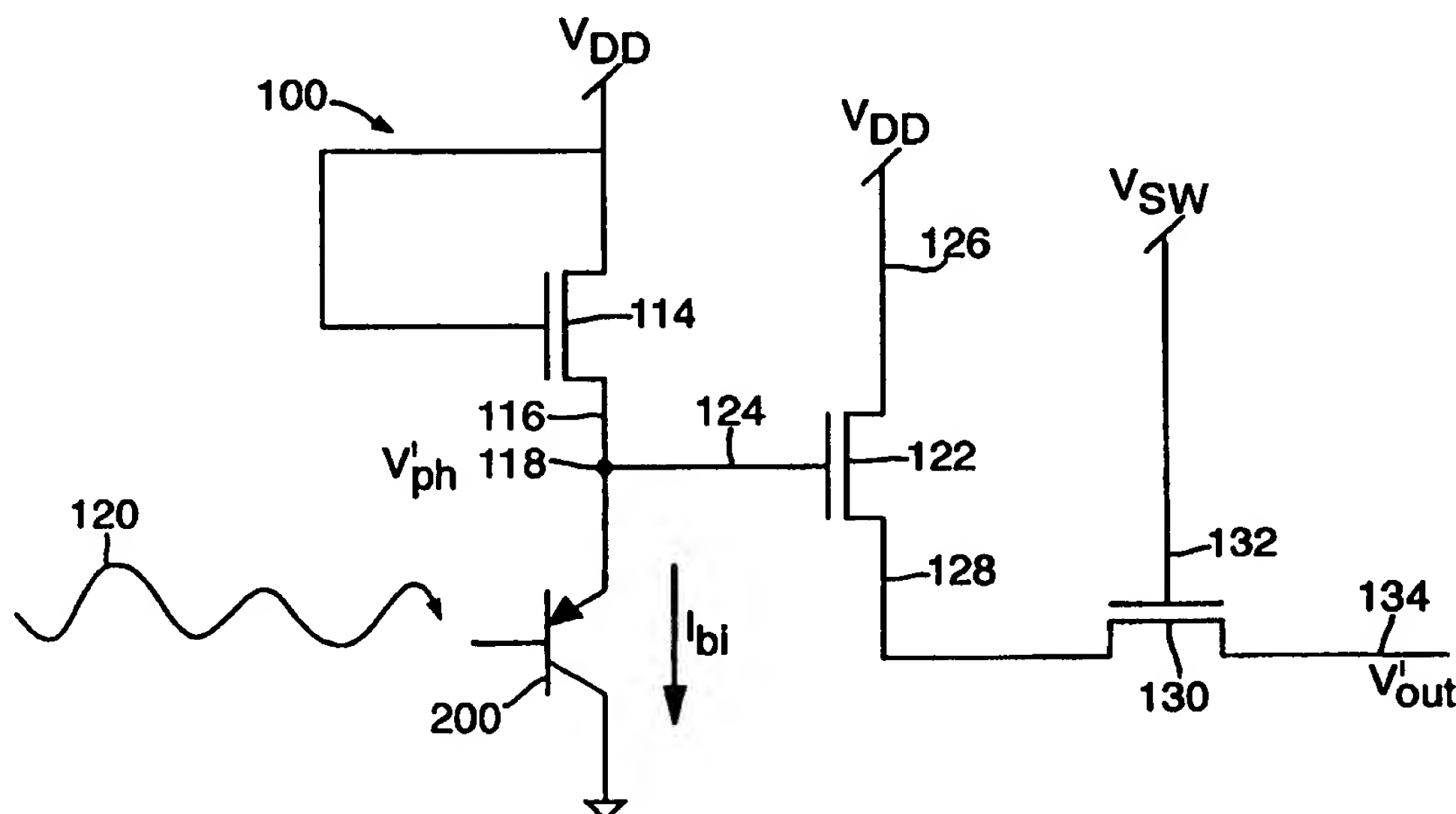
Patent document cited in search report		Publication date	Patent family member(s)	Publication date
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US 5276407	A	04-01-1994	US 5097305 A	17-03-1992
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			US 5324958 A	28-06-1994
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			JP 52072589 A	17-06-1977
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			US 5260592 A	09-11-1993
			US 5324958 A	28-06-1994
			US 5763909 A	09-06-1998
			US 5276407 A	04-01-1994
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## INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification <sup>6</sup> : <b>H01L 27/146</b>	<b>A1</b>	(11) International Publication Number: <b>WO 98/58411</b> (43) International Publication Date: 23 December 1998 (23.12.98)
(21) International Application Number: PCT/GB98/01734 (22) International Filing Date: 15 June 1998 (15.06.98) (30) Priority Data: 9712368.1                      16 June 1997 (16.06.97)                      GB (71) Applicant (for all designated States except US): THE SECRETARY OF STATE FOR DEFENCE [GB/GB]; Defence Evaluation & Research Agency, Ively Road, Farnborough, Hampshire GU14 0LX (GB). (72) Inventors; and (75) Inventors/Applicants (for US only): MARSHALL, Gillian, Fiona [GB/GB]; Defence Evaluation and Research Agency, St. Andrews Road, Malvern, Worcs. WR14 3PS (GB). COLLINS, Stephen [GB/GB]; Defence Evaluation and Research Agency, St. Andrews Road, Malvern, Worcs. WR14 3PS (GB). (74) Agent: BOWDERY, Anthony, Oliver, D/IPR (DERA) Formalities, Poplar 2a, MOD (PE) Abbey Wood #19, Bristol BS34 8JH (GB).		(81) Designated States: CA, GB, JP, KR, US, European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE).  <b>Published</b> <i>With international search report.            Before the expiration of the time limit for amending the claims and to be republished in the event of the receipt of amendments.</i>

## (54) Title: PHOTODETECTOR CIRCUIT



## (57) Abstract

A photodetector circuit (100) fabricated in BiCMOS exhibits improved temperature stability. A bipolar phototransistor (200) generates a photocurrent ( $I_{bi}$ ) in response to illumination. This photocurrent ( $I_{bi}$ ) is passed through a diode connected load MOSFET (114) operating subthreshold which gives a logarithmic voltage output. This ensures a large dynamic range of the photon detection system. The phototransistor (200) has gain ( $\beta$ ) which amplifies an initial current response and ensures that current  $I_{bi}$  through the load MOSFET (114) is significantly higher than MOSFET leakage current. This improves performance at high temperatures when the leakage current is large, whilst maintaining photodetector sensitivity to low illumination levels. The photodetector circuit (100) is particularly suitable for incorporation in a detector array (315) for use in a digital camera.

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